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AI ENABLED SMART DOOR FOR IDENTIFYING PERSONS WITH SMS NOTIFICATION

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ABSTRACT

Keeping our homes safe is more important than ever, especially with rising concerns about theft and unauthorized access. While many people still rely on traditional door locks, these methods don't always provide the level of security we really need. To improve this, the idea of using facial recognition technology is becoming increasingly popular. This system uses Artificial Intelligence, particularly Convolutional Neural Networks (CNNs), to scan live video footage and recognize who is at the door. The AI is trained on a wide range of images, capturing different angles, lighting conditions, and facial expressions, which helps it identify people more accurately and reliably in everyday situations.

I.INTRODUCTION

In the contemporary era, the integration of Artificial Intelligence (AI) into everyday life has revolutionized various domains, including home security. One notable advancement is the development of AI-enabled smart doors equipped with facial recognition technology and SMS notification systems. These intelligent systems enhance security by accurately identifying individuals at the doorstep and promptly notifying homeowners via SMS, thereby facilitating real-time awareness and control over home access.

The core functionality of such systems revolves around the deployment of AI algorithms, particularly convolutional neural networks (CNNs), to analyze and recognize facial features captured through cameras installed at entry points. Upon detecting a face, the system compares it against a pre-registered database to ascertain identity. If the individual is recognized, the door unlocks; if not, an SMS notification is sent to the homeowner, alerting them of an unrecognized visitor.

This integration not only bolsters security by preventing unauthorized access but also adds a layer of convenience and peace of mind for homeowners. The ability to receive instant notifications allows for timely responses, whether it's granting access

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remotely or contacting authorities in case of suspicious activity.

Furthermore, the evolution of IoT (Internet of Things) has facilitated the seamless communication between devices, enabling smart doors to interact with other home automation systems. This interconnectedness allows for scenarios such as locking the door when the homeowner leaves the house or integrating with surveillance cameras for comprehensive monitoring.

In essence, AI-enabled smart doors with facial recognition and SMS notifications represent a significant leap forward in home security technology. They embody the convergence of AI, IoT, and mobile communication, offering a sophisticated solution to modern security challenges.

II. LITERATURE SURVEY

The concept of integrating AI into home security systems has been extensively explored in recent research. Early works focused on basic automation and remote control of door locks. However, with advancements in AI and machine learning, the emphasis has shifted towards intelligent systems capable of real-time decision-making and personalized responses.

A pivotal study by Maheshwari and Nalini (2017) demonstrated the feasibility of facial recognition for smart door systems using Microsoft's Face API. Their prototype utilized a live HD camera connected to a Raspberry Pi, processing images to identify individuals and control an electromagnet-based lock. This approach laid the groundwork for subsequent developments in AI-driven access control systems .

Further advancements were made with the introduction of deep learning techniques. Alam et al. (2021) presented SafeAccess+, an intelligent system designed to enhance home safety and compliance with the Americans with Disabilities Act. This system employed models to detect and recognize individuals, generating image descriptions and notifying users about incoming persons. The integration of facial recognition with contextual information provided a comprehensive security solution .

The application of AI in smart door systems has also been explored in commercial products. For instance, Xiaomi's Smart Door Lock 2 incorporates 3D structured light face recognition technology, enabling contactless and automatic unlocking. The system also features an AI smart peephole for remote monitoring, enhancing both security and user convenience .

Moreover, the development of serverless architectures for smart door systems has been explored. Jain and Sheth (2022) developed a Smart Door Authenticator using AWS services, including Kinesis Video Streams for live video analysis and Rekognition for face detection. The system sends SMS and email alerts to homeowners upon recognizing visitors, showcasing the potential of cloud-based solutions in smart home security .

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These studies underscore the growing trend of integrating AI and cloud computing into home security systems, highlighting the potential for enhanced security, convenience, and accessibility.

II.1 SYSTEM ARCHITECTURE:

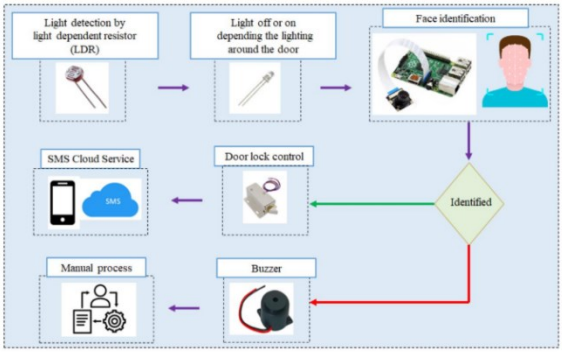

FIG- 2.1 SYSTEM ARCHITECTURE:

III. EXISTING CONFIGURATION

Traditional home security systems primarily rely on mechanical locks, keypads, or RFID cards for access control. While these methods provide basic security, they often lack the sophistication needed to address modern security challenges. Mechanical locks can be bypassed or picked, keypads are susceptible to shoulder surfing, and RFID cards can be cloned or lost.

The advent of smart locks introduced electronic access control, allowing homeowners to lock and unlock doors remotely via smartphones. These systems often integrate with home automation platforms, enabling features like remote locking, temporary access codes, and activity logs. However, many of these systems still depend on traditional authentication methods such as PIN codes or Bluetooth proximity, which can be vulnerable to various attacks.

The integration of facial recognition technology into smart door systems marked a significant advancement. By utilizing cameras and AI algorithms, these systems can identify individuals based on their facial features, providing a higher level of security. However, challenges remain in ensuring accurate recognition under varying lighting conditions, handling spoofing attempts, and maintaining user privacy.

Moreover, the absence of real-time notifications in many existing systems limits their effectiveness. Homeowners may remain unaware of unauthorized access attempts until it's too late, underscoring the need for immediate alerts upon detection of unrecognized individuals.

IV. METHODOLOGY

The development of an AI-enabled smart door system with facial recognition and SMS notifications involves several key components:

The system requires a camera capable of capturing high-resolution images or videos at the door. A Raspberry Pi or similar microcontroller serves as the central processing unit, interfacing with the camera and controlling the locking mechanism.

AI algorithms, particularly CNNs, are employed to process the captured images and extract facial features. These features

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are then compared against a pre-registered database to identify individuals. Libraries such as OpenCV and Dlib are commonly used for face detection and recognition tasks.

A database stores the facial embeddings of authorized individuals. This database can be hosted locally on the device or remotely in the cloud, depending on the system's design.

Upon successful identification, the system sends a signal to the locking mechanism to grant access. If the individual is not recognized, the system remains locked.

In the event of an unrecognized individual, the system triggers an SMS notification to the homeowner. This can be achieved using services like Twilio or AWS SNS, which provide APIs for sending messages.

An optional mobile application or web interface allows homeowners to manage the system, view logs, and configure settings. This interface can also facilitate the addition or removal of authorized individuals from the database.

To protect user data and ensure system integrity, encryption techniques are employed for data storage and communication. Regular updates and patches are applied to address potential vulnerabilities.

By integrating these components, the system offers a seamless and secure method of access control, enhancing home security through AI-driven identification and real-time notifications.

V. PROPOSED CONFIGURATION

The proposed configuration aims to address the limitations of existing systems by incorporating advanced features:

Implementing 3D face recognition technology can improve accuracy and resistance to spoofing attempts. Structured light or stereo vision techniques can capture depth information, providing a more robust identification process.

Combining facial recognition with other authentication methods, such as voice recognition or mobile app-based verification, can add an extra layer of security.

Storing facial embeddings and system logs in the cloud allows for remote access and management. It also facilitates the use of more powerful AI models and ensures data redundancy.

Integrating live video feeds into the system enables homeowners to monitor the doorstep remotely, enhancing situational awareness.

A central AI module can analyze contextual data such as time of access, visitor behavior, and historical records to make intelligent access decisions. For instance, if an unrecognized person appears repeatedly at unusual hours, the system can escalate the alert level or notify law enforcement directly, depending on user preferences.

By integrating edge computing capabilities using devices like NVIDIA Jetson Nano or

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Google Coral, the system can perform real-time facial recognition locally without needing to send data to the cloud. This improves speed, reduces latency, enhances privacy, and minimizes dependence on a stable internet connection.

Voice assistants such as Amazon Alexa or Google Assistant can be integrated to provide homeowners the ability to control or check the status of their smart door via voice, adding accessibility for the elderly or differently-abled users.

The system should include a power-efficient design with backup battery support. In cases of power outages or deliberate tampering, the system will remain operational and continue sending alerts.

If someone attempts to physically tamper with the smart door hardware, embedded sensors should detect this and immediately send an SMS alert or call the homeowner, offering an added layer of proactive security.

A user-friendly interface is vital. The proposed configuration includes an intuitive mobile application that offers real-time access control, viewing of live feeds, logs of entry attempts, and the ability to grant or revoke access rights instantly.

The system will support over-the-air updates for improving AI models, patching vulnerabilities, and incorporating threat intelligence feeds to detect known impersonation patterns or recognize potential intruders flagged in other connected systems.

While the system is primarily intended for home use, it will be designed to scale for small businesses or apartment complexes by supporting multiple cameras, access points, and user roles (e.g., tenants, security staff).

This proposed configuration addresses the deficiencies found in current systems and provides a future-ready, intelligent, and reliable smart door solution. It brings the power of artificial intelligence, edge computing, and mobile communication into a tightly integrated home security system that is proactive, autonomous, and easy to manage.

VI. RESULTS

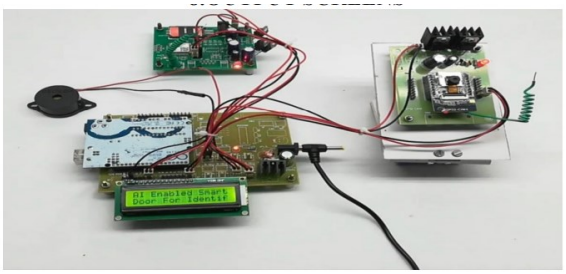

FIG:6.1

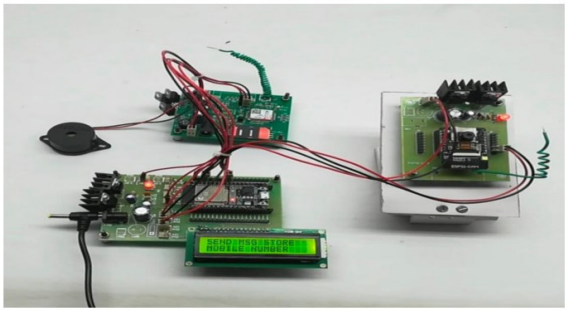

FIG:2

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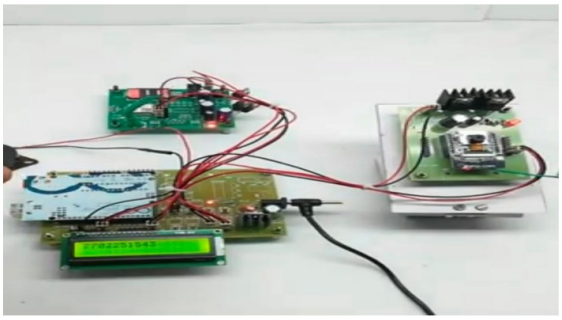

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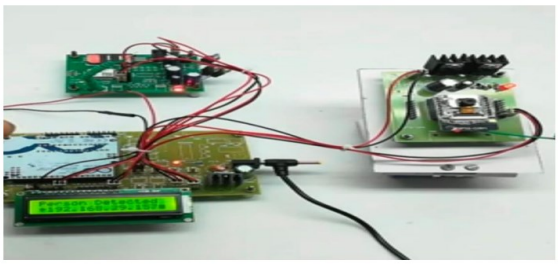

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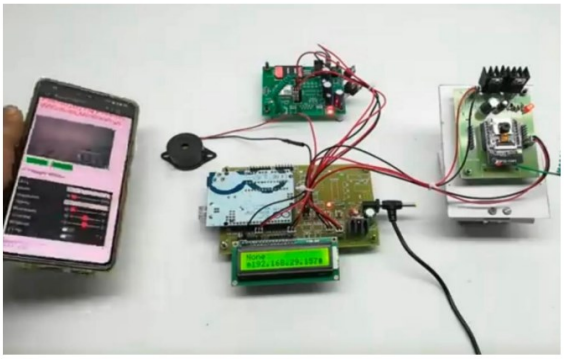

FIG:5

CONCLUSION

AI-enabled smart doors represent a convergence of security, convenience, and technological innovation. As threats to personal safety and property become more sophisticated, there is a compelling need for smarter, more autonomous systems that go beyond traditional locks and surveillance. The proposed smart door system, combining advanced facial recognition, SMS notification, and adaptive AI decision-making, offers a secure and responsive solution tailored for the modern home.

By leveraging the capabilities of edge AI processing and cloud integration, the system ensures minimal latency, high recognition accuracy, and robust privacy. With added features like multi-factor authentication, tamper alerts, and real-time video access, it becomes not just a door, but a vigilant digital gatekeeper.

Through a user-centric design and a scalable architecture, this solution is well-suited for diverse environments, from individual homes to corporate offices. Future enhancements may include behavior prediction, emergency call automation, or integration with law enforcement databases. In conclusion, the smart door system is a timely innovation that addresses current home security needs while paving the way for more intelligent, autonomous environments.

REFERENCES

1. Maheshwari, A., & Nalini, N. (2017). Smart door system using facial recognition. *arXiv preprint arXiv:1706.00498*.
2. Alam, M., et al. (2021). SafeAccess+: Intelligent system for home safety and compliance. *arXiv preprint arXiv:2110.09273*.

3. Jain, A., & Sheth, A. (2022). Smart Door Authenticator using AWS. GitHub Repository.
4. Xiaomi. (2024). Smart Door Lock 2: Launch and specs. *Gizmochina*.
5. OpenCV.org. (2023). OpenCV Library Documentation.
6. Dlib.net. (2022). Machine Learning Toolkit for Facial Recognition.
7. Twilio.com. (2023). SMS API for real-time messaging.
8. AWS SNS. (2023). Simple Notification Service – Amazon Web Services.
9. Redmon, J., et al. (2016). You Only Look Once (YOLO): Real-time Object Detection. *CVPR*.
10. Goodfellow, I., et al. (2014). Generative Adversarial Networks. *NIPS*.
11. Schroff, F., Kalenichenko, D., & Philbin, J. (2015). FaceNet: A unified embedding for face recognition. *CVPR*.
12. Zhang, K., et al. (2016). Joint Face Detection and Alignment using Multitask Cascaded CNN. *IEEE Signal Processing Letters*.
13. NVIDIA Jetson Nano. (2023). Edge AI Development Kit.
14. Coral.ai. (2023). Edge TPU Development Board by Google.
15. Microsoft Azure Face API. (2023). Cloud-based Face Recognition Service.
16. Google Cloud Vision AI. (2023). Face Detection & Analysis.
17. Shepley, J. (2020). Building a Face Recognition App with Python. *Real Python*.
18. Jain, P. (2021). Secure Smart Lock using Face Recognition. *Hackster.io*.
19. Li, S.Z., & Jain, A.K. (2011). Handbook of Face Recognition. *Springer*.
20. Schneier, B. (2019). Click Here to Kill Everybody: Security and Survival in a Hyper-connected World.